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271. Proposed by L. E. NEWCOMB, Los Gatos, California.

Sum the series $\frac{a}{b} + \frac{a^3}{3b^3} + \frac{a^5}{5b^5} + \dots$ to ∞ , $b > a$.

I. Solution by A. H. HOLMES, Brunswick, Maine.

Let $S = \frac{a}{b} + \frac{a^3}{3b^3} + \frac{a^5}{5b^5} + \dots$ etc., to infinity, $b > a$.

Put $\frac{a}{b} = c$, then $S = c + \frac{c^3}{3} + \frac{c^5}{5} + \dots$ $\therefore \frac{dS}{dc} = 1 + c^2 + c^4 + \dots$

Let $c^2 = e$. Then $\frac{2cdS}{de} = 1 + e + e^2 + e^3 + \dots = \frac{1}{1-e}$, $dS = \frac{de}{2c(1-e)} = \frac{dc}{1-c^2}$.

$$\therefore S = \frac{1}{2} \log \left(\frac{1+c}{1-c} \right) = \frac{1}{2} \log \left(\frac{b+a}{b-a} \right).$$

II. Solution by J. SCHEFFER, A. M., Kee Mar College, Hagerstown, Md.

Subtracting $\log(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$ from $\log(1+x) = +x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$, we get $x + \frac{x^3}{3} + \frac{x^5}{5} + \dots = \frac{1}{2} \log \frac{1+x}{1-x}$.

Substituting $x = \frac{a}{b}$, we obtain $\frac{a}{b} + \frac{a^3}{3b^3} + \frac{a^5}{5b^5} + \dots = \frac{1}{2} \log \frac{b+a}{b-a}$.

GEOMETRY.

294. Proposed by PROF. R. D. CARMICHAEL, Anniston, Ala.

Apply the locus of $(x^2 + y^2)^{\frac{3}{2}} = mx^3$ to the problem of finding a cube m times a given cube.

I. Solution by the PROPOSER.

Construct by points the locus of the equation. Take a value of x equal to the side of the given cube. Join the corresponding point of the curve to the origin. Denote this line by a . Construct the line numerically equal to the square root of a . Then evidently the cube of this line is mx^3 ; or this line is the side of a cube m times as large as the given cube.

II. Solution by G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va.

On $AB = \sqrt[3]{m}$ describe a circle. On AB lay off $AQ = x$, the edge of the given cube. At Q , erect a perpendicular intersecting the circle at P . Let $PQ = y$. Then since $AP^2 = \sqrt[3]{m} AQ$, we have $x^2 + y^2 = \sqrt[3]{m} x$, and, therefore, $(x^2 + y^2)^3 = mx^3$. Hence, the cube on AP is always m times the cube on AQ .